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A NOVEL STRATEGY FOR CORRECTION OF LIPID PROFILES VIA *MATRICARIA CHAMOMILLA L.*

Mansour Amraei[1, 2†], Naser Abbasi[1†], Ehsan Shirzadpour[3], Mahmoud Mohamadpour[3], Seyedeh Fatemeh Mousavi[4], Parastoo Shahmir[3*]

[1]Biotechnology and Medicinal Plants Research Center, Ilam University of Medical Sciences, Ilam, Iran.
[2]Department of Physiology, Faculty of Medicine, Ilam University of Medical Sciences, Ilam, Iran.
[3]Department of Clinical Biochemistry, Faculty of Medicine, Ilam University of Medical Sciences, Ilam, Iran.
[4]Prevention of Psychosocial Injuries Research Center, Ilam University of Medical Sciences, Ilam, Iran.

Abstract:
Statins which are most useful in reducing blood fat have a chemical combination and present various side effects. Identifying some plants with positive effects on reducing blood fat can be a great alternative to these chemical drugs. The current study has been carried out to compare the effects of hydroalcoholic extract of Matricaria chamomilla on the serum lipid profile in hypercholesterolemic rats. Twenty-five male Wistar Rats, ranging in weight from 150 to 180 grams, were assigned to five groups: the control group received an ordinary dietary regimen, the sham group was fed on a high cholesterol (2%) dietary regimen, experimental groups 1, 2 and 3 were given an ordinary nutrition plus chamomilla extract and Lovastatin dosages equal to 0.55 mg/ml, 1.1 mg/ml and 10 mg/kg were also, respectively, administered. Blood samples were taken on the first and the last days of the study period. To determine the blood's lipid profile and the serum cholesterol concentration, LDL-c, HDL-c and TG were measured and the results obtained for the groups were compared. The data were analyzed in SPSS 16 software. The results of the current research paper indicated that the treatment with 1.1 mg/ml chamomile hydroalcoholic extract and 10 mg/kg lovastatin significantly reduced (P<0.001) the total serum cholesterol concentration, LDL-c and TG in experimental hypercholesterolemic groups 2 and 3 as compared to the Sham Group. Also, it was found causing a significant increase in serum HDL-c in experimental hypercholesterolemic groups 2 and 3 in contrast to the Sham Group (P<0.001 and P<0.05, respectively). The mean weight scores of the Sham group and experimental group 1 were demonstrative of a significant increase in respect to control group (P<0.001 and P<0.01, respectively). The present study showed that the use of chamomile extract in hypercholesterolemic rats can bring about clearly discernible hypocholesterolemic effects and cause considerable and desirable effects on the serum lipid profile.

Keywords: *Hypocholesterolemic, Matricaria chamomilla, Lipid profile, Lovastatin*

† These authors contributed equally to this work.

Correspondence author:
Parastoo Shahmir,
Department of Clinical Biochemistry,
Faculty of Medicine,
Ilam University of Medical Sciences,
Ilam, Iran. Email: shahmir.parastoo @yahoo.com,
Tel: +988432235745; Fax: +988432227136

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INTRODUCTION:

One of the most important atherogenic lipoproteins is the lipoprotein rich in low-density cholesterol (LDL). Due to its ability to infiltrate into the endothelium or via its binding to the cell exterior matrix's components such as proteoglycan, the foresaid lipoprotein can be accumulated in the vascular intima [1]. The majority of the risk factors, including the high cholesterol and LDL, low levels of high-density lipoprotein (HDL) in blood, diabetes, obesity, hypertension, smoking, sedentary lifestyles, are controllable and the atherosclerosis can be delayed or totally prevented [2-4]. Arteriosclerosis begins with the formation of fat strips and it progresses with atheroma and the formation of plaques [5, 6]. Vegetative ingredients like vegetative essences and extracts of flavonoids predominantly possess antioxidant attributes [8, 9]. They also feature lower toxicity and side effects in comparison to the uncontrolled amounts of chemical compounds [10]. Flavonoids are phenolic compounds having low molecular weights [11] and are considered as strong antioxidants that can curb the lipid peroxidation [12, 13]. Chamomile is inter alia the medicinal plants for which various effects have been mentioned in traditional medicine. German chamomile, with the scientific name "Matricaria Chamomilla L.", is a plant belonging to Astraceae race [14]. Amongst the chamomile's use cases in traditional medicine, its application as a pain-reliever, anti-spasm and anti-inflammation drug, curer of the skin diseases (psoriasis, eczema), as well as for the treatment of bronchitis and cold, cough, fever, healing of the ulcers and treatment of digestive discomforts can be pointed out. According to its anti-emphysema and anti-spasm effects of the extracts from this plant, it has also been applied for the improvement of the digestive disorders and gastric ulcers [14-16]. Chamomile extract is consisted of 120 types of chemical ingredients the most important of which are camazolins and flavonoids and coumarines [14, 17]. The flovonoid compounds existent in chamomile are effective antioxidants in neutralizing the oxygenated radicals [17, 18]. Based on the particular importance of medicinal herbs application in the treatment of the diseases as well as due to the significant role thereof in the regulation of lipid profile having a large influence on the preservation of health in the body, the present study investigated the effect of hydroalcoholic extract of chamomile on the lipid profile in male Wistar rats.

MATERIALS AND METHODS:

Extraction: Matricaria Chamomilla plants were collected from the plains in the periphery of the city of Ilam and after undergoing scientific identification and verification, they were dried and milled. Then, the milled product was placed in a hydroalcoholic solvent (water and ethanol for a ratio of 20:80, respectively) in a shaker instrument for three days. The obtained extract was filter and the filtered solution was concentrated in a rotary device the product of which was exposed to a temperature ranging from 20 to 40 degree centigrade and finally a dried extract was obtained.

Animals and Treatments: Twenty-five adult male Wistar rats, with an approximate weight ranging from 150g to 180g were procured from Tehran's Pastor Institute and were kept in the ambient temperature, 22±3 °C and a 12:12 h dark-light period.

Grouping: The animals were randomly assigned to five five-member groups:

Control group: The animals of this group only received ordinary nutrition on a daily basis.

Sham group: The animals in this group received high-cholesterol (2%) dietary regimen.

In order to create identical conditions, these two foresaid groups and the experimental groups 1, 2 and 3 were administered with 2cc of the medication solution through gavage.

Experimental Group 1: the animals in this group received a high-cholesterol (2%) nutrition and 0.55 mg/ml chamomile extract.

Experimental Group 2: the animals in this group received a high cholesterol (2%) dietary regimen and 1.1 mg/ml chamomile extract.

Experimental Group 3: the animals of this group received a high-cholesterol (2%) dietary regimen and 10 mg/kg lovastatin.

Blood samples were taken from all the rats, once on the first day of the experiment onset and another time on the last day of the week eight. Then, the serum concentrations of HDL, TG and total cholesterol for each of the rats were measured by making use of diagnostic kits from Pars Azmoon Iran Company and evaluated in AutoAnalyzer Device, made by American Abott Company. LDL amounts were also determined by making use of Friedwald formula [19]: [LDL-Cholesterol = Total Cholesterol – HDL-Cholesterol – (Triglycerides ÷ 5)]. The results were examined by taking advantage of SPSS 16 software and t-test and one-way variance analysis (ANOVA). For each group of the rats, the mean levels of the variables were calculated in Means ± SD format. The boundary set for the statistical inferences significance was $P<0.05$.

Ethical Code: the present study has been granted an ethics code no. ir.medilam.1394.162 by the ethics committee of technology vice chancellorship and the research vice chancellorship of Ilam University of Medical Sciences.

FINDING:

As it is indicated in the results, the mean weights of the various groups studied in the current research paper do not reveal significant differences during the first week. In the end of the week four, there was only observable a significant increase in the mean weights of the sham group rats in contrast to the control group. In the end of the week eight, the mean weights of the experimental group one and the sham group animals were reflective of a significant increase in comparison to the control group (Table 1). According to the results obtained, 1.1 mg/ml dosage of chamomile extract has been able to well keep the HDL-c serum level within the control group limits even with rats being hypercholesterolemic (experimental group 2)($P<0.001$; compared to Sham group). The interesting point here is that lovastatin medication, with a dosage of 10 mg/kg, although having created considerable increase in HDL-c concentration as compared to Sham group ($P<0.05$), it has been found exerting lower effects in respect to 1.1 mg/ml of the chamomile extract in keeping fixed the serum concentration of HDL-c (Figure 1). Experimental groups two and three, treated with chamomile extract and lovastatin in dosages equal to 1.1 mg/ml and 10 mg/kg, respectively, demonstrated a normal level of cholesterol as compared to the Sham group ($P<0.001$). Treating the rats with a chamomile extract dosage of 0.55 mg/ml did not cause much of a change in the serum cholesterol level in hypercholesterolemic rats (Figure 2). The experimental group one that had been treated with a chamomile extract dosage equal to 0.55 mg/ml showed reductions in serum LDL-c concentrations but it was not considerable. But the administering dosages of 1.1 mg/ml of chamomile extract and 10 mg/kg lovastatin, to experimental groups two and three, respectively, reduced the LDL-c serum concentration to the control group limits ($P<0.001$; compared to Sham group)(Figure 3). The results on the TG serum concentration are indicative of the idea that the experimental groups two and three, that had received 1.1 mg/ml chamomile extract and 10 mg/kg lovastatin, respectively, demonstrated significant reductions in the serum concentrations of TG which was in an approximately normal range for these two hypercholesterolemic groups ($P<0.001$ and $P<0.01$, respectively; compared to Sham group). Instead, 0.55 mg/ml of the chamomile extract was not found capable of reducing the TG serum concentration and recording a normal range (control group limits) for it (Figure 4).

Table 1: Comparing the mean weights of the rats in various groups during the eight weeks.

Group	Mean ± SD (grams)		
	1st week	4st week	8st week
Control	157.33±5.31	192.62±6.26	230.75±6.03
Sham	160.83±5.45	208.71±5.40[b]	264.35±8.22[a]
Experimental 1	161.00±3.89	196.67±3.26	258.33±7.94[b]
Experimental 2	159.00±10.03	188.00±8.53	222.43±8.57
Experimental 3	160.00±10.43	185.00±7.12	221.05±7.21

a: $P<0.001$; b: $P<0.01$

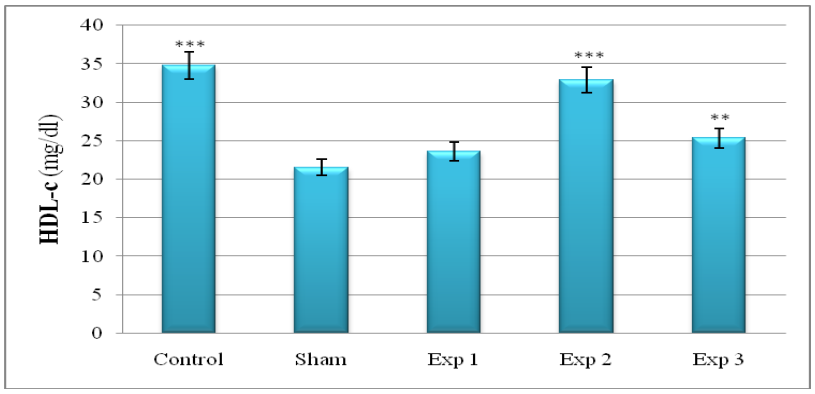

Fig 1: Comparing the HDL-c serum concentration between the various groups with Sham group.

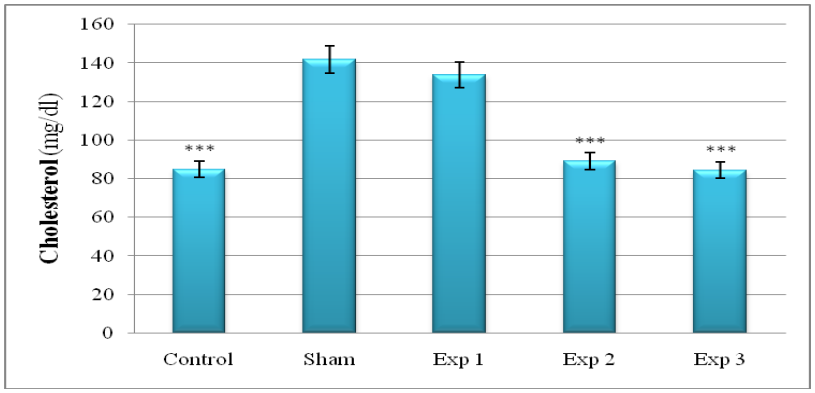

Fig 2: Comparing the cholesterol serum concentration between the various groups with Sham group.

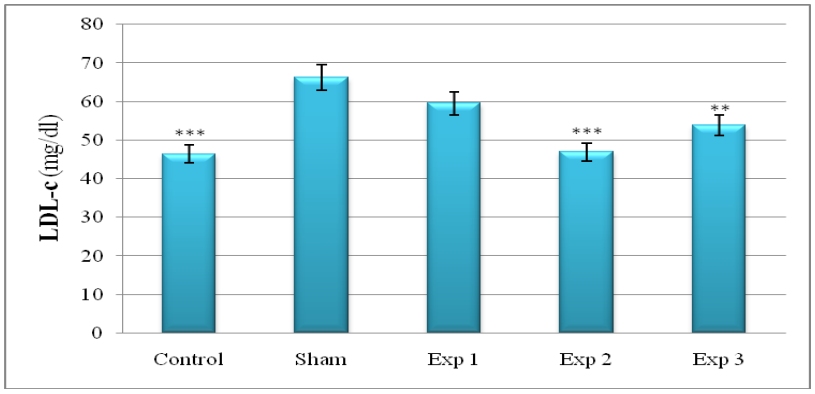

Fig 3: Comparing the LDL-c serum concentration between the various groups with Sham group.

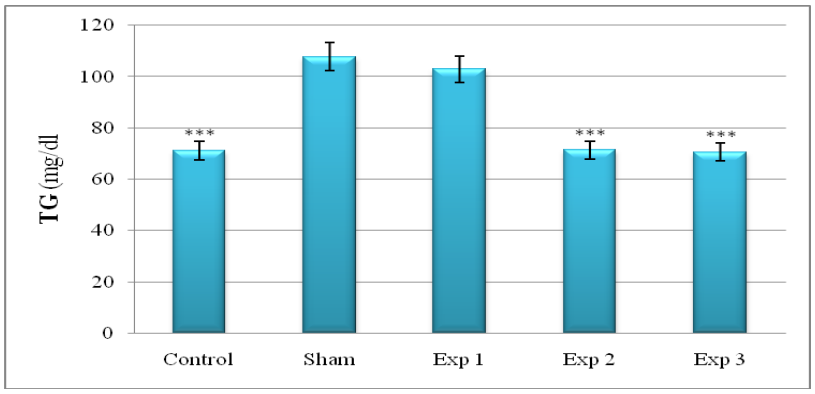

Fig 4: Comparing the TG serum concentration between the various groups with Sham group.

DISSCUSION:

The results obtained from the current study indicated that gavage-feeding of hydroalcoholic extract of chamomile for eight weeks to the rats induced with hypercholesterolemia significantly reduces the total cholesterol level, TG and LDL-c concentrations in comparison to the sham group, whereas the HDL-c serum concentration demonstrated a significant increase in contrast to the sham group. Such an effect is largely due to the chamomile extract dosages in such a manner that it has been well able to regulate the serum concentrations of the abovementioned factors to a normal limit even with the groups being hypercholesterolemic. Recently, there is created a challenge regarding the effect of elevated levels of HDL-c on the reduction of cardiovascular diseases. However, Onat et al showed that the high HDL-c cholesterol concentrations do not normally provide protections against the prospective heart diseases or diabetes [20, 21]. However, in the present study, the treatment featuring 1.1 mg/ml of chamomile extract considerably improved and enhanced the HDL-c serum amounts in hypercholesterolemic rats. The important point here is the better effect of the foresaid dosage in respect to lovastatin medication in such a way that it was found improving the HDL-c serum concentration to a normal range. Chamomile plant contains active ingredients including terpenoids and flavonoids [22]. Flavonoids obtained from various vegetative sources increase the LDL receptors in the hepatic cell level and bind them to apolipoprotein B thereby to increase the LDL removal from the blood and reduction of plasma lipids and this way it can be effective on the prevention and treatment of atherosclerosis [23, 24]. Saturated fatty acids increase the total cholesterol level via clearance controlling of the LDL-C receptive medium as well as by controlling the LDL-C receptors' expression [25]. Therefore, the unsaturated fatty acids extant in chamomile might possibly normalize the LDL-C receptors' activity and decrease the cholesterol retake. It has also been demonstrated herein that chamomile extract is capable of reducing and correcting the cholesterol levels. Khan et al in a study on rats nourished on high-cholesterol diets came to the conclusion that the phenolic ingredients control the HM-COA reductase activity and lead to the reduction in hepatic cholesterol storage [26]. The important point regarding chamomile is its lack of having side effects in such a manner that the American Food and Drug Association has declared its absence of any side effects on gestation, lactation and/or on children [27]. According to the therapeutic effects of flavonoids on the cardiovascular diseases, the use of the plants having these same ingredients seems to be necessary. The various studies on this plant are all suggestive of promising results [28, 29].

CONCLUSION:

In sum, the findings of the current research paper demonstrate that the hydroalcoholic extract of chamomile plant possesses antihyperlipidemic effect, particularly regarding the correction of HDL-c serum concentrations as compared to the effect of the chemical compounds having severe side effects. So, further research is suggested in line with the determination of the active ingredient in chamomile in correcting the lipid profile and clinical examinations on the patients with hypercholesterolemia by taking advantage of chamomile extracts are also recommended.

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